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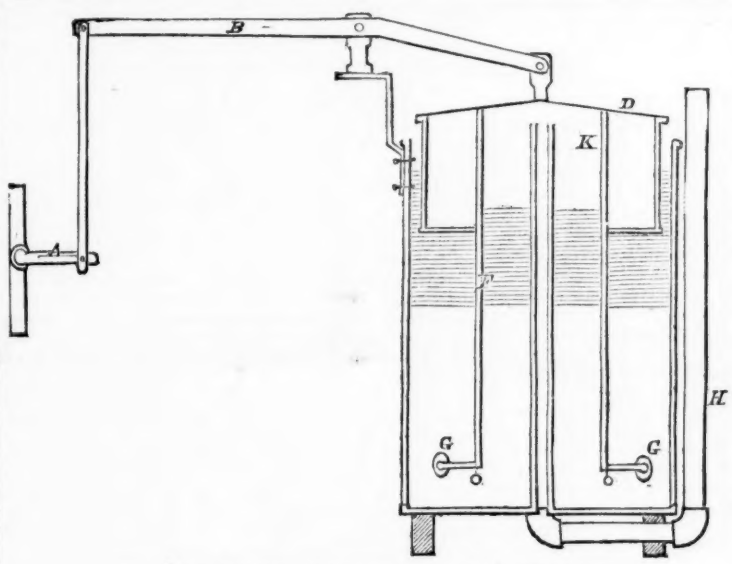
Trumbore's Exhaust Governor.

Gas engineers have long sought for a more effectual method of regulating the speed of engines used to run the Exhauster in gas works. The object has been to have the Governor automatic and instantaneous in action; while it shall be so simple in construction and operation that any one can understand and operate it. These qualities seem to have been attained by Mr. Trumbore, the inventor.

This invention relates to an improvement in Governors for regulating the speed of engines used for exhausting gas from hydraulic mains in gas works, whereby it is designed to provide a quick and more reliable acting Governor, such as is actuated by the pressure of gas in said mains. The drawing represents a sectional elevation of the improved apparatus. A, represents the throttle valve of steam engine which withdraws by the exhauster the gas from retorts, which stem is connected by lever, B, to float, D, resting on the water in the outer vessel, E, and having tubular extension, F, reaching to the bottom of the vessel with rollers, G, G, acting against wall of outer vessel, E. H is a tube connecting with hydraulic main leading into chamber, K; when the pressure in the retorts rises the float will be moved in a direction to open the valve and increase the speed of the engine, and *vice versa* when the pressure falls. By this arrangement the inventor is enabled to provide a much more sensitive governor than where the walls of said chamber are fixed.



TRUMBORE'S EXHAUST GOVERNOR.

For further information apply to Samuel Trumbore, Superintendant of Easton (Pa.) Gas Works.

Wyckoff's Patent Wooden Gas and Water Pipe.

The Roman engineers of ancient times, who were best skilled in hydraulics, employed the open water course or canal and aqueduct to convey water from the Anio and other sources to supply the city of Rome, and knew no other method except to allow it to seek its natural level in its onward flow. This led them to contruct those splendid, but costly specimens of hydraulic engineering—those aqueducts of solid masonry which still remain in a state of preservation, sufficient to testify totheir skill, energy, and perseverance.

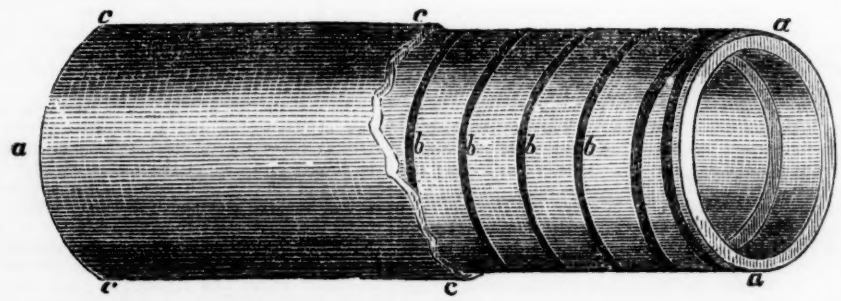
Modern times have given us the tube or pipe of some material to conduct the limpid element so essential to health and comfort, from its natural channel, to be dispensed to the denizens of our towns and cities.

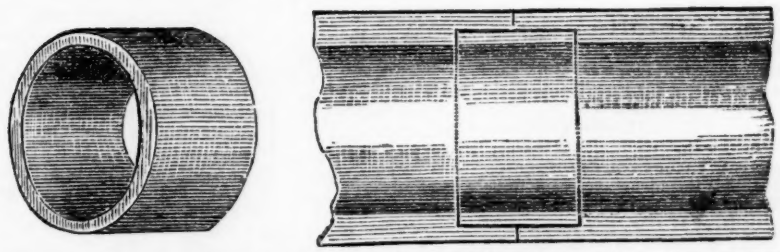
Lead, iron, and other metals have been used—so has clay and earthen pipes, all having their merits and demerits, in regard to cost, weight, durability, and the changes produced by heat and cold, to injure their character for imperviousness.

It has been the fortune of Messrs. Wyckoff Bros. & Co. to invent and bring into use wooden pipes, prepared with cement, which is conceded to be the cheapest substitute for both gas and water pipes, and at the same time, having the merit of lightness, being about one-third the weight of iron; and being less affected by changes in temperature than metal, which makes it less liable to leakage.

The pipes are made in sections of about eight feet each, connected by means of a socket-joint, which can be easily and properly put together by any ordinary laborer, only requiring to be driven together. Every piece of pipe is tested by hydraulic pressure, 25 per cent above the pressure required when in actual use.

Herewith will be found engravings and description of this piping. Fig. 1, view of pipe; fig. 2, thimble for connection; fig. 3, horizontal section and connection; *a a*, cylinder of wood; *b b*, bands of iron (not used in gas pipe); *c c*, coating of hydraulic or asphaltum cement.





WYCKOFF'S PATENT WOODEN GAS AND WATER PIPE.

Further information can be obtained by addressing Messrs. Wyckoff, Bros. & Co., Nos. 10, 12 and 14 Warren street, Elmira, N. Y.

Modern Gas Works at Home and Abroad.

[From a Paper read before the British Society of Engineers, by HENRY GORE, Consulting Engineer.]

(Concluded from page 212.)

In the arrangement of the apparatus of a gasworks' the next in order to the purifiers is the station meter' but as this machine exerts no direct influence on the process or products of manufacture, the author passes on to consider the means adopted for the storage of gas. On the first establishment of gasworks some very absurd opinions were expressed as to the form, construction, and capacity of gasholders. The restrictions proposed as to the dimensions of these vessels are certainly very amusing when recalled and contrasted with the monster creations of the present day. The demand for gas, consequent on the reduction of price, has led engineers to construct gasholders, the capacities of which are measured by millions, instead of hundreds of thousands of feet, as was the case formerly; attempting to answer satisfactorily the ever recurring question of economy. It must be admitted that the larger the gasholder the cheaper its cost at per thousand feet of its contents; but it is a question for serious consideration whether, as a matter of safety, these enormous depositories are not open to grave objections. So long as the quantity produced in the course of manufacture was the essential object of our manipulations, the effect on the quality of gas by its storage was only of secondary importance; but if, as we are by recent events led to believe, a much higher standard of illuminating power is to be imposed on gas manufacturers, the advantage of these enormous gasholders may not prove so obvious in the future as they appear at present; for, besides other reasons that will suggest themselves to the mind of every competent gas engineer, the fact that the storing of gas (especially such as contains any considerable amount of hydrocarbon vapors), is sure to result in an appreciable diminution of its illuminating effect is, of itself, a good ground for objection against the construction of what the author cannot help calling injudiciously large gasholders. Before leaving this part of his paper, the author might have been expected to say a word or two in reference to the mode in which some of these vessels are constructed, but as these are purely mechanical details, and do not in any way effect the condition or quality of the gas, he will reserve his remarks upon this subject, until offering a few observations upon the peculiarities necessary in the construction and arrangements of gasworks in foreign countries. Before concluding the first section of this paper, the author desires to say a few words on the most favorable localities for gasworks, and the means of distribution. In selecting a site for works, the following are among the most essential desiderata: Sufficiency of area, a low level, a good supply of water, good drainage and easy access. Even in some modern works these important conditions are sometimes most palpably neglected; as a general rule, however, they are complied with. In the earlier times of gas engineering it was thought desirable that the supply should be as near as possible to the centre of the consumption, but modern practice removes our gasworks to remote distances, and some enthusiastic persons have even suggested the removal of the manufactories to the centres of our coal districts. Wild as this proposal seems, it might possibly be realized, if gas and not light was the product to be supplied; but if the public demand gas light, and not light gas, then the proximity of the works to the locality of the consumption must be a vital element in the economy of gas manufacture. The longer the distance through which the gas has to travel before reaching the burner of the consumer the greater will be the loss of illuminating power; hence it follows that a company supplying gas three or four miles from the district or place where the gas is to be consumed will have to use a much larger proportion of cannel, or other light-producing material, to produce and supply gas of equal quality with a company only a mile from its consumers. It is very questionable if the advantages said to be gained in a sanitary point of view, or the greater economy effected in the delivery of raw materials, and the distribution of residual products, as coke, tar, liquor, etc., will all compensate for the increased outlay in mains and the attendant loss of illuminating power.

Having thus touched upon some of the leading principles in the construction of modern gasworks, viewed in relation to their adaptation for the production of light, and not simply the generation of gas, the author now proposes to offer a few remarks on the construction of gasworks in new and less advanced countries than England, such, for instance, as the continent of South America, the field in which this branch of engineering practice has been most recently introduced. As it is a continent for a great part difficult of access, it may be presumed to afford a very fit illustration of the difficulties which attend the practice of the gas engineer in remote countries.

The principal gas establishments on the east or Atlantic coast of South America are those of Para, Ciara, Pernambuco, Bahia, Rio de Janeiro, Monte Video, and Buenos Ayres. There are also works in course of erection at several of the chief cities and towns on the banks of the rivers La Plata and Parana; but the recent war with Paraguay has caused a temporary suspension of these works. On the Pacific, or west coast, there are works at Guayaquil, Callao, Lima, Thena, Copiapo, Valparaiso, and Santiago de Chile. The works on the east, or Atlantic coast, with the exception of those at Rio de Janeiro, are constructed on the English model, to use ordinary English gas coal, with a small admixture of Wigan or Scotch cannel.

In Rio de Janeiro the works were originally intended for a modification of White's hydrocarbon process, using American resin as the source of illuminating power; but the works, after undergoing several modifications, are now virtually adapted for coal. On the Pacific coast, with the exception of Guayaquil, all the works are of English construction; but all of them use a considerable quantity of native Chile coal in the production of the gas, mixed with English or Australian coking coal, and more or less of Wigan or Scotch cannel. The principal coal basin of Chile is situated between 36 deg. and 41 deg. of south latitude; it contains several varieties of coal, but that best adapted for gas is obtained from Lota, Coronel and Pachoco. It yields at fair working heats, about 8,000 English cubic feet to the ton, of an average illuminating power of 14.30 standard candles. The coke is light and friable, but as the natives employ charcoal for all culinary and heating purposes, the coke meets with a ready sale, being a good substitute for the charcoal. The proportions of tar and ammoniacal liquor are somewhat different from those resulting from the use of English coal, the quantity of tar being much less, but of ammonia much in excess averaging 190 lb. to 200 lb. to the ton. The percentage of sulphur is high, and found principally in the form of sulphate of lime, with some curious nodules of pyrites. The first gasworks erected on this coast were those of Lima and Valparaiso; these were of purely English type, and not the best adapted for the climate or peculiar nature of those countries. The retorts are set in beds of five and seven to a furnace. The retort house in Lima is constructed with a raised charging stage, and a coke depository below; in Valparaiso the charging floor is on the ground level. In both establishments the retorts are charged with the scoop. In consequence of the prevalence of earthquakes, chimneys, of even moderate altitude, are inadmissible; it was therefore found that beds of seven retorts could not be worked advantageously. In the works at Valparaiso the form of setting ultimately adopted was that of five, set in tiers of three and two. The retorts are 14 in. by 14 in., D shaped, and 8 feet long inside; the furnace is 2 feet 3 in. long and 7 in. wide at the bars, and 5 feet 6 in. long, and 1 ft. 4 in. wide in the body. The heat is conveyed into the retorts by a row of apertures or nostrils on each side of the arch of the furnace; from these it rises between the centre and outside retorts, and after circulating round the two upper retorts, escapes to the chimney by flues under the two outside lower retorts. The average duration of the clay retorts is about two years and of iron retorts thirteen to fourteen months. The mean yield per mouthpiece is 3,200 cubic feet each twenty-four hours; the absence of sufficient draught is a serious drawback to the efficient working of the furnaces, but this has been obviated recently by converting the horizontal main flue into a series of short chimneys. This plan is now in successful operation at the magnificent new station of the New York and Manhattan Gas Company. There each double setting of ten retorts, set back to back, is furnished with a small separate chimney, the products of combustion being carried through the roof of the retort house by an iron tube. The author, in constructing the new works for the city of Mexico, has adopted this plan, and has found that, even with wood fuel, clay retorts can be maintained at a good carbonizing heat, adopting, it should be noted, the necessary precaution of increasing the width of the body of the furnace. In designing gasworks for new countries it is a great error to be guided solely by home practice, especially in reference to retorts and furnaces. The number of retorts in a setting should never exceed five, and even in the largest works, settings of threes should always be provided. The demand for gas in some of these countries is not at all uniform, especially in the case of public lighting; special festivals, and the exercise of police and municipal authority frequently interfere to affect in an important degree the quantity of gas required. To meet such exigencies, it often happens that it would be better to light up two beds of threes than one bed of fives, or *vice versa*. Simplicity of arrangement in the setting of retorts is also of the utmost importance, so that the bricklayers' and other work may be performed by comparatively unskilled operatives. The employment of native labor is an essential element in the success of all gasworks abroad.

The condenser, scrubbers, and purifiers at Valparaiso are of the form and description usually found in gasworks at home. In the original design arrangements had been made for cooling and refrigeration by using a large quantity of water, but this was found unnecessary. The purification of the gas is effected by the use of oxide of iron and lime. There are four purifiers each 10 feet square, and 3 feet 6 in. deep, with five tiers or sieves. On the four lower tiers the oxide is placed in layers from 6 in to 7 in. thick, on the top tier the layer of lime is 4 in. thick. In consequence of a very large proportion of the gas being supplied to private consumers, and from the peculiar construction of the rooms in Spanish-American houses, it was necessary to pay particular attention to the purification. The purifiers are worked in a series of three; the third one is always kept free from sulphur by putting a clean purifier in action as soon as the second of the series discolors the acetate of lead test.

The site of the works being close to the sea rendered the construction of a brick tank impracticable; the tank and gasholder are therefore of iron. The gasholder is 80 feet diameter, and 24 feet deep, in a single lift. The roof is flat without trussing. The outside, or guide framing, consists of eight cast-iron tripods, with wrought T iron braces and girders. The gasholder gives a working pressure of 3 2-10in.; it was designed at the period when non-trussed gasholders were considered the *ne plus ultra* of economical construction; but we must not always estimate the value of a machine or apparatus by its prime cost, and it is very questionable if it is prudent to sacrifice safety and efficiency for economy. The gasholder at Valparaiso has been a constant source of anxiety from the upper ring or flange getting out of shape. If a gust of wind caught the holder when it was full, the strain on the outer row of roof sheets often caused the rivets to strip, and produce leakage. But the greatest drawback to the use of untrussed gasholders abroad is, the risk of bad workmanship in rivetting up the top flange and rows of boiler plate; this is a difficulty often experienced at home, but the risk is tenfold greater abroad. Before concluding his remarks on the gasholder, the author would refer to what may appear a very simple matter, but really one of very great importance in hot dry climates, namely, the means of keeping the gasholder cool during the hottest part of the day. It is the universal stipulation on the part of the gas companies that the public lamps shall not be lighted when the moon is visible, and the practice is to reduce the stock of gas in the gasholder at such times as low as possible, consistently with safety, relying on the retorts to meet any sudden extra demand. During the summer, or dry season, the evaporation caused by the heat of the sun's rays is so great that an immense quantity of aqueous vapor is formed in the gasholder, which is carried forward by the gas into the mains and fittings, causing great annoyance and trouble. Painting the roof of the gasholder white, and several other expedients have been tried to get over this difficulty, but the only one attended with any success has been sprinkling the roof with water by means of a rose jet. Notwithstanding all that could be done, a very considerable amount of water is from time to time deposited in the mains and fittings, and it requires constant and careful attention to avoid inconvenience to the consumer.

The distribution of the gas is controlled by governors at the works, and by regulating valves in the streets; these valves are necessary in consequence of the sudden elevation of the mains used for lighting a portion of the city built on a plateau at the height of several hundred feet above the main streets that surround the bay. An error frequently committed in this country is to suppose that the quality and illuminating power of the gas are matters of no moment in countries such as are now referred to; it is impossible to make a greater mistake, and for these reasons; those who would burn light at all, or at least those who would burn gas light, are exclusively those of the class who have been in the habit of using either sperm oil, camphine, or wax or spermaceti candles; any new source of illumination must be at least equal or superior in brilliancy to each of these, and not more costly. Again, the rooms are generally very lofty, especially in the best class of houses, and to light such apartments well, requires that the gas should be of superior quality; it should not, therefore, be surprising that the average illuminating power of the gas in Valparaiso is twenty standard candles, the minimum being nineteen candles. The failure, at a certain juncture, to maintain this quality by the company whose works have been described, caused so much dissatisfaction as to lead ultimately to the establishment of a competing company for the exclusive supply of private consumers. Their works are placed in the centre of their consumption which averages 80,000 cubic feet per night, and their average annual loss of gas unaccounted for is scarcely six per cent. It may not be out of place to mention here the cause of the reduction of the illuminating power of the gas on the occasion alluded to. The com-

pany had been in the habit of keeping a large stock of Boghead cannel, but became unwilling to continue this system, and arranged to receive periodical supplies of a few hundred tons, as ships could be found to take it as dead weight cargo. Trusting to the arrival of one or more such shipments, the stock became exhausted, and by a strange fatality two ships conveying cannel met with accidents, so that no cannel arrived for several months. To improve the quality of the gas a large quantity of American resin was bought, and used in conjunction with common coal. The gas produced from this mixture, when used in the vicinity of the works, appeared of tolerably good quality, but the consumers in the district most remote from the works soon had grave cause for complaints, first, for want of light, arising from the depreciated state of the gas; and secondly, for a still greater source of annoyance from their fittings becoming stopped up by a viscid tarry deposit that collected at every angle, bend, or tap. The irritation caused by this unlooked-for difficulty, as already stated, laid the foundation of the new company.*

As a set off to these misfortunes, several very useful practical lessons were learned in respect to the deportment of gases generated from different substances in the same retorts, and subjected to the same processes of purification. In the course of the experiments made when the coal supply failed, the following materials were used:—resin, dregs of whale oil, several varieties of vegetable oil, asphalte, refuse of sugar-cane, wine lees, and creasote or dead oil. In using the resin, oils, and asphalte, the best results for enriching the gas were obtained by mixing the gases after the coal gas had been passed through the purifier, and allowing the mixed gas to pass through a dry scrubber before entering the gasholder.

In the management of gasworks in remote countries, it frequently occurs that the engineer is called upon to purchase or use coal of a character and quality of which he is entirely ignorant; it is therefore highly important he should be able to make one or more commercial experiments before committing himself to the use of the strange coal. All coal, except some of the varieties of Scotch cannel, undergo a marked deterioration in their gas making qualities when exposed to a long voyage, and especially in passing through the tropics. Another source of trouble and annoyance, particularly on the west coast of South America, is the gross frauds practiced in the use of false certificates as to the names and descriptions of coals offered for sale. All foreign gasworks should be fitted up with an experimental arrangement of retort, purifier, meter, etc., and the retort should, if possible, form one of the ordinary sets charged by the stokers in their usual course of work. It frequently happens, however, that the results obtained by special manipulation are far from realized by ordinary commercial practice, and in no branch, probably, of what may be called chemical manufacture, has this experience been more frequently manifested than in gas-making. The greatest discrepancies between laboratory experiments and practical working are of the most common occurrence, and the most disastrous losses, as well as painful disappointments, have often resulted from the attempt to carry into practice processes founded upon chamber investigations.

In concluding these remarks on foreign gasworks, especially for warm or tropical climates, the author would suggest the desirability of the greatest simplicity in the design and construction of the requisite buildings, and the absence of all complication in the machinery and apparatus. The buildings, if not used as store rooms for valuable goods, should be merely roofed sheds, supported on iron or even wooden pillars. All enclosing walls should, as far as practicable, be avoided. Care should be taken to provide ample covering for coals, but with sufficient ventilation. An abundant supply of water is essential, with appliances for raising streams or jets to a considerable altitude. In all cases where hydraulic valves, self-acting seals, or lutes, and especially in the lutes to purifiers, the depth of the sealing fluid should be greatly increased. The tanks of gasholders, if required to be made of iron, are better of wrought iron than of cast, particularly in countries exposed to earthquakes. If the engineer is not well aware of the nature of the ground, either by personal inspection, or very reliable information, he should shrink from designing a brick or stone tank for such countries. In laying street mains especial care should be taken to ensure a more than average depth below the surface, and a sufficient, but not too great, inclination or fall. It is also a wise precaution to make the capacity of syphons of tar wells greater than those usually employed in this country.

In carrying on the operations of a gas establishment in countries similar to those just described, the engineer will find his duties and responsibilities infinitely more arduous and onerous than those he would be called upon to discharge in the situation of a manager and engineer at home; it is therefore of the utmost importance to him that his works and apparatus should be as simple as possible, consistently with due efficiency.

Above all, let him employ to the utmost extent to which they are available the labor and the materials of the country. In doing this he will have to pluck up deeply rooted prejudices probably to place in abeyance well grounded opinions, the soundness of which he may have thoroughly proved, under other but widely different circumstances; this he should be ready to do with cheerful alacrity and unreserve. Assuredly he is most certain in a foreign country to achieve success in engineering and manufacturing enterprises who acquires the most thorough knowledge of, and influence over, the inhabitants of the country, and masters most completely an acquaintance with the character and capabilities of its productions; who can enlist the hearty cooperation of the people, and lay the native products under contribution to subserve his purposes; who, in a word, most completely adapts himself to the peculiarities of the circumstances, influences, and objects, which surround him in the New World in which he is placed.

* This difficulty would not have occurred if the quantity of resin had been restricted to ten per cent. of the weight of coal used.—Ed. Am. Gas-Light Journal.

The New York Society of Practical Engineering.

[*Reported Expressly for this Journal.*]

The regular fortnightly meeting of this society took place on Tuesday evening, January 19, at Room 24, Cooper Institute. President James A. Whitney, Esq., in the chair.

The chief business of the evening was the reading of a paper on "The Casting and Forging of Metals" by Mr. James Harrison, a founder and metal worker of this city. The writer noticed the various uses of the founders art as applied to supply the necessities and luxuries of everyday life. In the delicate constructed watch and the massive anchor, in the useful utensils of the kitchen and the ornamental furniture of the parlor, in the gigantic steamer plowing the ocean and the railroad girding the land, in the flying locomotive, in the framework of the cars and in machinery of all kinds we see evidences of the skill of the founder and metal worker. In agriculture, the winnowing and mowing machines, the plow, the harrow and various other implements, exhibit his handiwork.

The writer said that the preparation of the mold to receive the metal involved the consideration of six points:

First—The preparation of the loam or sand to suit the required kind of work. A mold suitable for casting small pieces would not resist the pressure of the molten metal in the casting of larger ones. Provision must also be made for the escape of the air from the mold, and also the gas generated by the contact of the hot metal with the cold loam.

Second—Facing or blackening. Various materials, such as powdered charcoal, plaster of Paris, and powdered fire-clay are used for facing, according to the kind of work to be done. Facing gives a smooth finish to the work. The metal will eat through the sand if the facing is too thin, and the work will be rough. If the facing is too thick the pores will be stopped and the confined gases will burst the mold. Facing suitable for small, will not answer for large work.

Third—The "Vent"; this is provided for the escape of the air and gases from the mold when the metal is poured in. Should the vent be too open the gas will rush through too fast, tearing away the walls of the mold and allowing the metal to follow, to the destruction of the casting. Again, if the vent is too small the confined gases will cause the metal in the mold to flutter until the casting is destroyed by the escape of gas through the surface of the metal. To obviate this danger the writer described a device called "the riser." This device consists in a conical hole in the mold, filled with soft clay to which a suitable weight is attached according to the size of the casting. If the gas escaped by its proper channel the weight would be undisturbed, but if the mold had been made too close so that the gas could not thus escape, then the gas lifting the clay and weight would escape. By this device the escape of gas could easily be regulated.

Fourth—The gates or runners. These are the openings through which the metal is poured into the molds. The common method of pouring the metal from a ladle into a duct to be conveyed to the mold has a great disadvantage. The skimming of slag and dross from the surface of the metal while being poured from the ladle is a very difficult operation. To overcome this difficulty the writer proposed a "self-skimming" runner. The metal is poured into a basin from which it flows through a gutter into a smaller basin, forming a current around it, and from this it flows in the same manner to a third basin smaller than the second and forming a current around this also. From the third basin it flows into the mold in a purified state. To explain this process it is supposed that the circular current in the basins causes the dross and slag to accumulate in their centers.

Fifth—The size of the runners is a matter of considerable importance.

Sixth—The temperature at which the various metals should be poured. The writer thought this the most important consideration in successful molding. Nine-tenths of the bad castings are due to the want of a proper means of testing the temperature of the molten metal at the time of pouring. A pyrometer suitable for performing such a test without injury to itself would be a highly desirable as well as remunerative invention.

The writer then discussed the mixing of metals. He observed that some cast iron is very brittle and yet capable of resisting great pressure. Iron which has been melted over several times comes under this head.

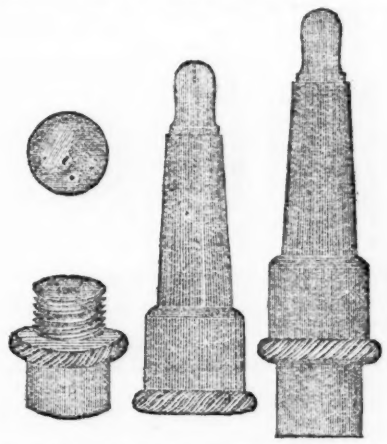
Malleable iron suitable for machinery castings can be made by mixing as many kinds of iron as possible in a furnace. Ordinarily iron melted in a cupola is not as good as that remelted in a furnace. The quality of the metal is affected both by the fuel used and atmospheric changes. The nature of the blast also has an effect upon it. It was strongly recommended that large castings, such as columns and shafts should be cast hollow and the inside cooled first.

The casting of bells was noticed, and a description given of a musical instrument composed of bells of various tones. This instrument is to be played with keys like a piano and has a range of seven and a half octaves.

A discussion followed the reading of this paper, after which the society adjourned to meet again on Tuesday, 2d February.

Patent Valve Gas Burner.

The art of manufacturing illuminating gas and distributing it to consumers is one thing; the art of burning gas economically is quite another matter. If the pressure of gas in the street mains and service pipes is above 5-10ths of an inch water pressure, the gas will be emitted at the burner too rapidly to yield the full effects of combustion and illumination, and as the pressure increases so does the loss to the consumer, ranging from 10 per cent. to 70, and even 100 per cent.



The patent valve gas burner illustrated herewith is designed to avoid this loss by means of a spring valve, which closes and checks the flow when the pressure of gas is too high to burn economically, and opens to give free passage to it. The cuts exhibit a burner complete, also one taken apart showing the perforated septum or plug, having its little metallic spring valve on the inner side, which closes or opens the little passage in the plug as the pressure varies. This causes the flame to burn in a regular and uniform manner, and avoids flickering and blowing, besides economixing the gas.

It is especially adapted to domestic use in private houses, stores, shops, factories, public buildings, street lamps, etc. It also has an indestructible lava tip.

These burners are quite popular, and are becoming extensively used. For further information apply to or address Messrs. Avery & Co., Springfield, Mass., who manufacture and sell the same. Their advertisement may be found in another column.

—The Grass Valley *National* of Nov. 7th says that rock from the extension of the Dromedary, belonging to Bradley & Hand, is now being crushed. The rock looks finely, shows free gold in abundance, and is very rich in sulphurets. Sixty or seventy loads from a part of the North Star, which is let on contract, is awaiting its turn. Rock from this place has heretofore yielded $50 per ton. Several loads of boulders are on hand, and prospectors evidently are not idle.

Kerosene.

Quality of the Kerosene Oil sold in New York City—Report of Prof. C. F. CHANDLER *to the Metropolitan Board of Health.*

The burning fluid sold so extensively throughout the United States, under the name of kerosene oil, is refined petroleum from the oil wells of Pennsylvania, Ohio, Virginia, Kentucky, and Canada.

As it comes from the wells, petroleum is generally of a dark yellowish or greenish brown color, and possesses an odor more or less offensive.

To render it saleable it is subjected to a process of refining by which it is rendered almost colorless, and freed as much as possible from its disagreeable odor. One of the most important objects of the purification is, however, the separation of the more volatile constituents, the benzine, keroselene, gasoline, or naphtha, as they are variously called.

These liquids being very volatile, and at the same time very combustible, are the substances which give rise to the explosions which render the use of kerosene so dangerous, and fill the newspapers with accounts of frightful burning accidents.

Their removal, therefore, is a matter of the greatest importance for the consumers of the oil, but unfortunately there is not so ready a sale for the benzine as for the burning oil, consequently its price in the market is less than that of the oil.

The cupidity of the refiner leads him, therefore, to leave as much benzine in the kerosene as possible, regardless of the frightful consequences which result from frequent explosions.

COMPOSITION OF PETROLEUM.

Native petroleum is a mixture of a great number of hydrocarbons, compounds of hydrogen and carbon. These differ from each other in volatility; some are so volatile as to evaporate rapidly at ordinary temperatures, making it dangerous to approach an open tank of petroleum with a flame; others are much less volatile, some requiring a temperature of 700 degrees to 800 degrees, Fahrenheit, to vaporize them.

The volatility of these component hydrocarbons is intimately related to their specific gravity or weight, the lightest ones being the most volatile, while the heavier oils possess the high boiling points. The inflammability of the oils is also intimately connected with the volatility and specific gravity.

The light volatile oils ignite on the approach of a burning match, no matter how cold they may be, while the heavy, less volatile oils can only be ignited when they are heated above the ordinary temperature of the air.

VARIETIES OF PETROLEUM.

There is considerable difference in the character of the petroleum from different wells; some containing large proportions of the light benzine and naphtha, while others are heavy and thick, and suitable for lubricating machinery.

The specific gravity of crude petroleum varies in consequence of these differences from 0.773 (50° Beaume) to 0.910 (23° Beaume).

The average composition of Pennsylvania petroleum is:—

Gasoline	above 65 deg. B	10
Naphtha	59 deg. to 65 deg. B	10
Burning oil	36 deg. to 59 deg. B	76
Lubricating oil	below 36 deg. B	
Coke and loss		4
	44 deg. B	100

For want of American examples, the following results of analyses of a number of samples of Italian petroleum, made at the laboratory of the School of Mines, are introduced to illustrate the variety which exists in the oils, even when occurring in the same district:

ITALIAN PETROLEUM.

No.	Gravity.	Naphtha above 59 deg. B.	Burning oil, 59 deg. to 36 deg. B.	Lubricating oil, below 36 deg. B.	Coke and loss.
1.....	47½ deg. B.	10.00	78.21	9.64	2 15
2.....	50 deg. B.	9.20	89.65	none.	1.15
3.....	34 deg. B.		58.93	38.21	2.86
4.....	26 deg. B.		28.33	77.93	3.74
5.. ..	25 deg. B.			96.60	3.40
6.....	24 deg. B.			97.27	2.73

REFINING PETROLEUM.

The crude petroleum, as it comes from the wells, is subjected to distillation, when the most volatile constituents pass off first, in the form of vapor, and are condensed by passing through a coil of iron pipe surrounded by cold water, and collected as benzine or naphtha. Subsequently the burning oil or kerosene makes its appearance. This is followed by a heavier oil, which may be used for lubricating machinery, and there is finally a small residue of tar or coke left in the still.

That portion of the product which is designed for illuminating oil is then subjected to the action of sulphuric acid to remove the odor and color, and destroy a little tar which it still contains.

It is then subjected by the more careful refiners to a somewhat elevated temperature to expel a small percentage of benzine which it still contains.

Thus purified, it constitutes the kerosene oil as it is sold in the market.

QUALITY OF KEROSENE OIL.

There is no natural dividing line between benzine or naphtha, burning oil, and lubricating oil.

These liquids flow in a steady, uninterrupted stream from the still. If we collect a sample and test it with the hydrometer, it may have a specific gravity of 75 deg.; then it is light benzine or gasoline; and if we continue to test it from time to time, we shall find that it becomes heavier and heavier, till finally it may perhaps reach 20 degrees Beaume, when we have heavy lubricating oil.

The fractioning of the distillate is entirely arbitrary, and has resulted from the adaptation of the different products to different purposes in the arts.

In the earlier revenue laws of Congress the following classification was established:

Gasoline or benzine oils, lighter than 70° Beaume.
Naphtha, between 59 deg. and 70 deg. Beaume.
Burning oil, bet. 36 deg. and 59 deg. Beaume.
Lubricating oil, below 36 deg. Beaume.

The refiner tests the stream as it flows from the still, and when it reaches a certain gravity, he diverts it from the benzine tank to the burning oil tank.

The conscientious refiner runs all the dangerous oil into the benzine tank, and only when the oil is sufficiently heavy does he allow it to pass into the "kerosene" receiver. But as the benzine must be sold at a lower price than burning oil, the refiners are many of them led to collect as little benzine and as much kerosene as possible.

It must not be supposed, however, that the specific gravity of the oil can be considered a safe index of its quality. On the contrary, the specific gravity gives very little idea of the quality, for while benzine and gasoline render the kerosene lighter, the gravity of good kerosene is preserved by the presence of heavier oils. So a poor, dangerous oil may be much heavier than a safe oil.

THE FIRE TEST.

As the products of petroleum are dangerous in proportion to their inflammability, a fire test has long been in use by which the temperature is determined at which the oil evolves an inflammable vapor—the "vaporizing point"—and the temperature at which the oil itself may be kindled with a burning match—the "burning point"

The vaporizing point of good kerosene oil should not be much below 100 deg. Fahrenheit. Unfortunately, the results of this investigation show that but little of the oil sold in New York comes up to this standard.

The old law of Congress fixed 110 deg. Fahrenheit for the burning test, but this law was unfortunately repealed.

The fire laws of New York fix the burning point at 100 deg. Fahrenheit, which is decidedly too low, as is shown by the great increase in the number of burning casualties.

PROCESSES FOR RENDERING BENZINE NON-EXPLOSIVE.

Processes have been patented, and vendors have sold rights throughout the country, for patented and secret processes, for rendering benzine, gasoline and naphtha non-explosive. Thus treated, it is sold under such names as "Liquid Gas," "Aurora Oil," etc.

These patents and secret processes are not only ridiculous, but their sale to ignorant persons is a crime only equalled by murder.

It is impossible to render these light oils non-explosive and safe. The addition of a few grains of alum, potash, borax, alcohol, gum camphor, etc., to a barrel of benzine does not change its dangerous character in the least. The experiment of pouring a little of the fluid into a bottle and applying a burning match, is no proof whatever, for to produce an explosion it is necessary to secure a certain ratio of air to benzine vapor, which it would not be possible to do in a bottle once in fifty times.

The fire test gives the only sure indication; apply a lighted match to a little of the oil contained in a cup or saucer, and if it can be made to take fire, it should be considered as unsafe—even though the experiment be made in one of the hottest days of summer—should it not take fire, it might still be a dangerous oil, as safe oil must not evolve a combustible vapor below 100 degrees Fahrenheit, nor take fire below 110° F.

Experimenters must be reminded that great care is necessary in applying this test, as persons not accustomed to make such experiments are liable to serious accidents. By carelessly trying the fire test on a sample of kerosene a gentleman in New Bedford burned up the entire refinery, oil, barrels, still, and buildings.

QUALITY OF THE KEROSENE OIL SOLD IN NEW YORK.

In compliance with the direction of the Metropolitan Board of Health, seventy-eight samples of kerosene oil have been procured from the same number of retail dealers in different parts of the city.

These have been carefully subjected to the fire test to determine the vaporizing and burning points.

Several of the samples have also been subjected to fractional distillation to determine the proportions of benzine and naphtha which they contain; the results are given in the following tabular statement, in which the samples are arranged in the order of quality, beginning with the poorest:

GRAVITY, VAPORIZING POINTS, AND BURNING POINTS OF THE KEROSENE OILS SOLD IN NEW YORK.

No.....	Locality.	Gravity, Beaume..... degrees.	Vaporizing point, Fahrenheit scale.	Burning point, Fahrenheit scale...
1	40 East Broadway	71.4	*18	*18
2	72 Bayard street	49	31	44
3	494 Grand street	46.6	40	60
4	331 West Forty-fourth street	46.3	45	69
5	200 Sixth avenue	47.2	45	65
6	47 Houston street	48.2	45	68
7	216 Canal street	47.9	48	64
8	822 Second avenue	50.2	49	72
9	1855 Third avenue	46 7	51	68
10	164 Avenue C	47 6	52	61
11	5 Pike street	47.4	53	61
12	104 Avenue D	48.5	54	103
13	655 Seventh avenue	45.8	57	100
14	583½ Ninth avenue	48 1	58	87
15	107 Division street	46.4	58	83
16	566 Eighth avenue	45.1	58	110
17	665 Eighth avenue	45 5	59	78
18	793 First avenue	46.9	61	67
19	104 Division street	46 6	62	92
20	111 Mulberry street	46 2	65	97
21	556 Eighth avenue	45 8	66	83
22	Tenth avenue, corner Fifty-fourth street	45.2	66	93
23	88 Division street	44.5	66	115
24	689 Sixth avenue	45.9	66	98
25	454 Third avenue	45.6	66	85
26	21 Mott street	45 8	69	87
27	200 Grand street	48.8	69	89
28	64 East Broadway	45.6	71	103
29	122 Canal street	44 5	71	113
30	48 Prince street	46.7	71	104
31	179 First avenue	45.7	71	98
32	641 Second avenue	46 9	72	88
33	427 Grand street	45.8	72	108
34	1917 Third avenue	46.1	72	98
35	1881 Broadway	45.9	73	97
36	5 Chatham square	45	73	89
37	297 Houston street	45.2	74	112
38	1890 Third avenue	46.2	74	97
39	333 Bowery	44.8	74	101
40	211 Avenue B	45.8	75	94
41	899 Second avenue	45.5	76	106
42	747 Second avenue	45.2	77	105
43	490 Seventh avenue	48.8	77	104
44	67 Mott street	46	77	108
45	269 Bowery	44 6	77	96
46	81 Mercer street	45.8	77	108
47	722 Eleventh avenue	45.8	77	96
48	Corner Seventh avenue and Seventeenth st.	45.4	78	99
49	40 Houston street	45.5	78	102
50	455 Goerck street	48.8	78	104
51	74 Third avenue	45.6	78	99
52	98 Eighth avenue	45.1	79	114
53	Corner Seventh avenue and Sixteenth st.	44.7	79	105
54	129 Sixth avenue	45.9	79	100
55	912 Second avenue	46.8	79	103
56	722 Second avenue	44.7	80	112
57	858 Second avenue	46	80	114
58	113 Mercer street	45.9	80	101
59	49 Avenue D	45.7	80	103
60	45 Mott street	45.1	80	106
61	444 Second street	45.4	80	113
62	108 Mulberry street	45.4	81	109
63	15 Marion street	45.1	82	115
64	104 Canal street	45.	83	112
65	562 Ninth avenue	45.	84	104
66	697 Third avenue	45.5	84	118
67	728 Third avenue	44.7	85	101
68	57 Division street	45.1	85	105
69	160 Eighth avenue	45.	86	105
70	382 Tenth avenue	45.9	86	99
71	633 Second avenue	45.9	87	92
72	132 Mulberry street	44.2	88	117
73	508 Second avenue	45.2	89	107
74	8. Jenny	46 9	90	115
75	860 Second avenue	45.8	90	106
76	550 Grand street	46.3	90	108
77	772 Third avenue	45.5	94	113
78	761 Third avenue	46	94	113
79	Downer	46.1	109	128

* Below 18 deg. F.

COMPOSITION OF KEROSENE SOLD IN NEW YORK.

No.	Locality.	Gravity, degrees Beaume.	Benzine gasoline & naph	Burning oil.
1	40 East B'way	71.4 B.	90 pr. c.	10 per et.
8	822 2d ave	50.2	20 "	80 " "
18	793 1st ave	49.9	10 "	90 " "
32	641 2d ave	46.9	6 "	94 " "
56	722 2d ave	44.7	3 "	97 " "
67	728 3d ave	44.7	3 "	97 " "
74	Jenny	46.9	2 "	98 " "
79	Downer	46.1	None.	100 " "

From these figures it will be seen that not one of the 78 samples, selected at random throughout the city, which are all that were tested, is of a good quality, and may be called safe.

The only safe specimen on the entire list is No. 79, manufactured at the extensive works of Downer, in Boston, and which I obtained from that city by the hands of a friend. When camphene and burning fluid were in extensive use, and produced such frequent accidents, we could not blame the manufacturers, as it was not possible to make these preparations of turpentine safe. But every refiner can send a perfectly safe kerosene to market if he chooses; he may make it stand fire at 110 degrees F., 120 degrees F., 130 degrees F., or any other temperature he may elect—it is merely a question of a few cents, more or less, per gallon. Consumers should understand that in demanding the cheapest oil they compel the refiners to supply them with a mixture of benzine and kerosene. Competition is irresistible; and if the price is run down below cost adulteration must follow. It is a source of gratification to know that Downer, of Boston, has one of the most extensive refineries in the country; he is able to make a perfectly safe oil, charge a higher price for it, and sell all that he can make. Who would hesitate to pay five, ten or fifteen cents per gallon for the difference between an oil which is perfectly safe, and one which is liable to destroy one's wife or children at any moment by a horrid death? The first sample on the list, No. 1, contains 59 per cent. of gasoline above 70 deg. B., 40 per cent. naphtha above 59 deg. B., and only 10 per cent. of illuminating oil. It would be safer to have gunpowder in one's lamp, because that substance would remain quietly out of the way of fire, but this oil is so volatile that it seeks the flame of its own accord.

Even the eighth sample contains 20 per cent of benzine; the eighteenth sample 10 per cent.; the thirty-sixth sample 6 per cent.; and no sample, save Downer's, less than 2 per cent. of this dangerous liquid.

The results of this examination will, I think, be sufficiently startling to interest the members of your honorable body in the speedy enactment of suitable laws for the protection of the poorer classes who are not supplied with gas, and are consequently dependent on the honesty of the refiners and retailers of kerosene.

There is only one plan by which the safety of the public can be insured, and that is by the enactment of stringent laws, compelling the refiners to remove these dangerous substances from the kerosene, and inflicting heavy penalties upon those who are reckless enough to endanger the lives of innocent purchasers.

A proper inspection of the kerosene sold, made under the authority of the Board of Health, would prove sufficient to enforce such a law.

For the purpose of registration, the retailers should be required to procure licenses from the Board.

The sale of dangerous oil should be followed by confiscation, loss of license, and perhaps fine.

The investigation is not yet completed, as the study of the lamps in which it is burned is now in progress. In fact it is only by a study of the lamps that we can decide upon a proper standard for the oil.

I shall, therefore, have the honor to present at an early day a further report upon the lamps designed for burning kerosene oil. C. F. CHANDLER, Ph. D.,

Chemist to the Metropolitan Board of Health.

NEW YORK, January 11, 1869.

OFFICE OF THE METROPOLITAN BOARD OF HEALTH, No. 301 MOTT STREET, Jan'y 21, 1869.

COL. EMMONS CLARK,

Secretary of the Metropolitan Board of Health:

Sir,—I have the honor to transmit the following supplementary report of the results of the investigation of "Dangerous Kerosene Oil," ordered by the Metropolitan Board of Health:

SUPPLEMENTARY REPORT ON DANGEROUS KEROSENE OIL.

In continuing the investigation with regard to dangerous kerosene, it was considered a matter of importance to ascertain the temperature to which the oil is heated in the lamps while they are burning, as a knowledge of this point is obviously a preliminary to the establishment of a proper standard for safe oil. To this end twenty-three different lamps were purchased, such as are commonly used in the Metropolitan District. Eleven were of metal, mostly brass; twelve were of glass. These were all filled with the same oil, and allowed to burn for seven hours; the temperature of the oil in each lamp being determined at the end of 1, 2, 4, and 7 hours. The temperature of the room was nearly constant during the experiment, varying from 73° F. to 74° F.

The range of temperature observed was from 76° to 100° F., the highest temperature of 100° having been reached in a brass lamp at the end of the first hour.

That this is an exceptionably high temperature is proved by the fact that the highest temperature reached in any other lamp was 92° F.

The temperatures in the eleven metal lamps varied from 76° to 100° F., the average being 86° F. The temperature in the twelve glass lamps varied from 76° F. to 86° F., the average being 81° F. The average temperature of all the observations on all the lamps was 83° F.

I do not consider these experiments to have established any claim to superior safety on the part of glass lamps; on the contrary, the greater liability to fracture fully counterbalances the slight difference in the heating of the oil. The comparative safety of the different lamps in use can only be determined by an elaborate series of experiments which is beyond the scope of the present communication.

Moreover, if the retailers of kerosene are compelled by the Board of Health to sell safe oil, the comparative safety of different lamps will be of little consequence.

EXPERIMENTS ON THE TEMPERATURE OF OIL IN BURNING LAMPS.

No.	Kind of Lamp.	Capacity of lamp.	Temp. of the Oil. After 1 hour.	After 2 hours.	After 4 hrs.	After 7 hrs.	Aver. for the 7 hrs.
1	Brass hand lamp..	8 oz.	85° F	92° F.	85° F.	86° F.	84°5 F.
2	" " "	24 "	79°	83°	84°	82°	82°
3	Glass stand "	8 "	77°	78°	79°	80°	78°5
4	" " "	11 "	77°	81°	84°	82°	81°
5	" " "	20 "	78°	79°	79°	80°	79°
6	" " "	7 "	82°	86°	85°	84°	82°75
7	" " "	10 "	84°	86°	84°	82°	84°
8	Glass hand "	9 "	79°	78°	85°	85°	81°75
9	" " "	6 "	81°	83	86°	86°	83°75
10	" " "	7 "	80°	78°			79°
11	Brass student lamp	13 "	82°	80°	88°	84°	82°25
12	Glass stand "	10 "	81°	81°	79°	78°	79°75
13	Brass " "	11 "	92°	89°	88°	86°	88°75
14	Tin lantern	7 "	80°	86°	88°	87°	85°5
15	Glass bracket lamp	19 "	82°	82°	84°	83°	82°75
16	Glass stand "	29 "	82°	80°	80°	84°	81°5
17	Brass student "	7 "	80°		88°		84°
18	Brass stand "	14 "	84°	85°	87°	87°	85°75
19	" " "	12 "	100°	100°	92°	91°	95°75
20	Metal " "	9 "	82°	82°	85°	87°	84°75
21	Brass " "	12 "	91°	92°	85°	85°	89°
22	Bronze " "	16 "	88°	76°	79°	85°	80°75
23	Glass hand "	6 "	79°	80°	82°	82°	80°75

These experiments prove that in the lamps generally used in the Metropolitan District, the temperature does not often rise above 90° F., and that an oil which does not evolve an explosive vapor below 100° F., and does not take fire itself below 110° F. is perfectly safe. I would therefore respectfully recommend that in making laws to regulate the sale of kerosene oil in the Metropolitan District, the Board fix

100° F. for the vaporizing point,

110° F. for the burning point of safe oil,

and permit none to be sold which falls below this standard. C. F. CHANDLER, Ph. D.,

Chemist to the Metropolitan Board of Health.

ACTION OF THE METROPOLITAN BOARD OF HEALTH.

The reports of Professor Chandler were referred to Mr. D. B. Eaton, Counsel of the Board, and on the 25th of January he reported the following ordinance:

"No petroleum oil, kerosene oil or other liquid having like composition or qualities as a burning fluid as said oil, shall be kept or offered for sale as a burning fluid, for lamps or any like receptacle, for the purpose of illumination, nor shall such oil or fluid be purchased for use, or be used as a burning fluid for any such lamp or receptacle, or be kept for such use, unless all such oil or fluid shall be of such quality and ingredients that it shall stand and be equal to both the following tests and conditions, to wit:

"1. That it shall not take fire or burn at a temperature below 110 deg. Fah.

"2. That it shall not evolve an explosive vapor below 100 deg. Fah."

The ordinance was unanimously adopted, and the Sanitary Superintendent, Dr. Elisha Harris, was directed to cause a special inspection to be made by the Chemist to the Board, of the various qualities of kerosene sold throughout the Metropolitan district. The Secretary was also directed to advertise the new ordinance in the daily newspapers for three weeks, at the expiration of which time it will become an operative law.

Shade Produced by Light.

A curious illustration of the distinction between the actinic and the luminous quality of light has been recently communicated by the well-known photographer, Mr. Rejlander, to the *Photonraphic News*. A few days ago he was producing a portrait in the open air, a little after seven in the evening. The setting sun, low in the horizon, illuminated all objects on which it shone with a yellow glow; whilst the opposite arch of the sky was bright, clear and blue. On examining the sun-illumined image on the ground glass, Mr. Rejander was struck with the fact that the side which was practically in shadow was much more actinic in color than the rest, and was convinced that the side of the face on which the sun shone would, in the picture, be the darkest side, whilst the opposite and apparently shaded side the lightest. Such was indeed the result; and the very fine print obtained illustrates the odd phenomenon of sunlight being represented by shadow in a photographic image.

Chemical Repertory.--No. 7.

FEBRUARY 2, 1869.

Under this head it is my purpose to lay the foundation of what, I trust, may grow in time into a most important, if not the leading, department of this Journal.

Time will be a necessary element in the erection of this, as of any edifice intended to be substantial and enduring. I hope to enlist the assistance of American chemists. This may be an ambitious hope, but time will show.

I shall most cheerfully offer explanations and reply to questions on chemical points, addressed to me at this office; and I solicit all such.

HENRY WURTZ.

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9. SHODDY, MAMMON & CO. IN THE OIL TRADE.

This subject, at last so prominently before the public, is one which *we* have never ceased from the first to urge. [A hasty turning over of our files for but *twenty* issues back enables us to refer to about *ten* warnings by us to the public; namely April 2, 1868; May 2 (3 articles); July 16 (2 articles); October 16; November 16 and December 2.] Doubtless, nevertheless, to the vast majority of the public it has the aspect, we might almost add the charm, of perfect novelty. Whose fault is this? The only reply can be, that of the *public newspapers*, whose duty it should be to convey, somewhere among the incredible masses of indigestible trash which they daily serve up to their much-abused readers, the few wholesome grains of salt furnished them by such scientific and practical journals as ours. That the accusation of culpable neglect and systematic stolidity, which we here solemnly (though but in passing) bring against those who pretend to be the mental purveyors for the community, may not lack further substantiation; we shall merely at present refer to the apparent contempt with which the New York press has passed by our recent exclusive and most valuable information under the head of the "Drinking Waters of the American Metropolis," in our issue of January 2, 1869.

It is hence from the public, and not so especially from us, that thanks are due to Professor CHANDLER, for bringing before them, through the Board of Health, this vital subject, in such an official way, that it can no longer be avoided, either through ignorance, stupidity, or fear of *incurring unpopularity* among those interested in the manufacture and sale of spurious and deadly imitations of articles affecting the safety and welfare, and even the life itself, of every human being in every civilized land. Still, Professor CHANDLER has *our* earnest thanks also; for having given us, by virtue of the important position he so ably fills, such valuable assistance in our work. We publish today, for the first time, his own complete and authorized version of his Report, the garbled and inaccurate renderings of which by the daily press, have created so much excitement. As the subject is neither exhausted, nor in fact exhaustible, we shall touch further here upon a few points

The rum-adulteration question, to the supposed importance of which such a prominence has lately been given; in one aspect (even if we credit every diatribe that has been uttered), sinks into far less significance than this. Men kill *themselves* with alcohol knowingly, and rush into the jaws of death with open eyes; and the adulterated article is after all, for them, but what TENNYSON calls a "poisoned poison;" but the Petroleum-Fiend seizes upon ignorant women and children, as the victims of his hellish holocaust. The slaughter of the Innocents, and the burning of Hindu widows, is paralleled here, among the latest works of Mammon and of Belial, in Christian lands.

The subject is assuming *more and more* importance. Let it not be thought that the dwellers in cities are less concerned therein, because of the prevalent use of gas; and that petroleum endangers lives and property only among the rural population. It is precisely the reverse. The careful housewives of the agricultural districts do not entrust their petroleum cans and lamps to the hands of servants, but manipulate them themselves, in such manner that the risk becomes a minimum; but in the cities, this explosive is almost always put into the hands of the ignorant, often of the reckless. Moreover the fact, beginning to be recognized, that no gas-light is equal to a good petroleum lamp for *steadiness* and softness of light, especially for *reading* or *writing* purposes, is rapidly leading to the introduction of such lamps far and wide, into all the best households of the land. But what master of such a household ever thinks of using, or even of owning, the simple and cheap testing arrangements so long for sale (that of TAGLIABUE for instance). By the way, how absurd is the recent editorial whine in a leading daily—

"Why will not some practical chemist turn his attention to the invention of a cheap machine for testing kerosene in private houses? Such a contrivance would

find an immediate and very large sale, if its merits were guarantied by chemists of acknowledged character; it would set at rest troublesome fears in a great multitude of households, and save numerous lives every year."

We could laugh at this, were the subject not too fearfully solemn. The responsibilities of such a journal we should not care to sustain.

A stern and rigid *scientific* INSPECTION is the only thing. We here DEMAND it of our legislators. It *must* be in the hands of *Chemists*, of learning, training and experience, in fact the best and most conscientious Chemists in the land. If like the Spirit-Inspection, the Drug-Inspection, and similar "institutions" in this country, it is left susceptible of the least control or prostitution by politicians, it will simply become another similar laughing-stock, and another feeder of that corrupt pool in which no man with clean hands and sound morals longer seeks to dabble. The whole will then fall into the hands of the "practical men," a self-constituted and self-styled class of charlatans, whose rule over the American people of late years is a phenomenon only to be explained by the superficialty of general education among the masses of this people, which prompts them to underate what they do not themselves know (as "not worth knowing"), and to be gullible by every brazen knave who can use "the gift of the gab wery gallopin."—H. W.

CHEMICAL *EXCERPTA.*

Under this head I purpose to gather in the most *condensed* form practicable, from such recent scientific journals, both at home and abroad, as come under my eyes; the substance of such articles as seem deserving thereof. In this work, I shall not, as might be thought, hold myself confined to novel facts alone; regarding new hypotheses, and even speculations, when involving labor and ingenuity in the *generalization* of facts, as even more valuable to Science. It is hardly necessary to add that in my own comments, to which a degree of personal responsibility attaches, a less condensed style than in the abstracts themselves will be inevitable.

HENRY WURTZ.

Effects of Variable Tensions on Saturated Vapors.

The results of a most admirable research on this extremely important subject, by CAZIN, has appeared during the last year (*Comptes Rendus* of June 8). His apparatus was a horizontal copper cylinder, enclosed, as to its cylindrical wall, in an oil-bath, whilst its ends were closed by plate-glass. Another cylinder, superimposed vertically, also in the same oil bath, contained a piston. The vapor under experiment, engendered in a separate boiler, was admissible above and below the piston, by tubes which could be heated to ensure dryness, or saturation; said boiler having a pressure-gauge. Construction was due to the skill of GOLAZ. The mists produced by varying tensions are often but momentary, particularly in cases of compression, as the cooler walls then quickly balance the temperature, and the mist then almost instantly *condenses* on the glass plates, thus introducing difficulties of observation. CAZIN therefore uses a *telescope*, so adjusted as to "focate" the exact centre of the experimental cylinder. The faintest mist becomes thus without difficulty visible.

Steam, within the limits of temperature in the investigation, always condensed by expansion, and *never* by compression.

Ether-vapor becomes troubled, on the contrary, when compressed. CAZIN points out, however, that these facts, relating to these two liquids, are but confirmatory of the previous results of HIRN. *Chloroform* gave a mist when *expanded*, up to 130° C., remaining transparent by compression. Above 136° C., however, compression produced a mist, which increased proportionally with the original temperature; a fact never observed in cases of expansion.

With *benzole*, mist appeared upon expansion, up to 115°, and upon compression above 136°. CAZIN calculates that the temperature at which dry steam begins to be condensed by compression, instead of by expansion (as it is below this temperature) is 520° C., agreeing with the formula announced by RANKINE in 1854. The corresponding temperatures for other liquids are, for ether 113°, for chloroform 123°, for benzole 100°.

H. W.

Sharpening of Files by Corrosion.—The use of acids in the restoration of worn out files is ancient: but in view of the immense number of these used up in this country, the following precise formula, translated from the *Chemisches Centralblatt*, is worthy of record. A public report says upon this subject:

"Some idea may be formed of the file business of the United States, when it is shown that from four to five millions of dollars worth of files are annually imported, and from five to six millions are manufactured here, and large as the supply is, it is not sufficient for the demand. From fifty to one hundred thousand dollars' are used in some large iron work shops, as well as government and railroad machine shops, yearly."

The files are first washed with a hot lye of soda, and all grease removed with brushes. They are then suspended in a mixture of concentrated nitric acid with eight parts by measure of water for 25 minutes; then well cleaned in water with brushes, and reimmersed for 25 minutes more in the acid mixture with addition of another eighth of strong acid. Brush again and reimmerse, after adding to the bath a 16th part of concentrated sulphuric acid. This heats the bath, and the etching proper now commences, and is kept up for three minutes, with a vibratory motion of the bath. Wash and brush and reimmerse in a bath similar to the last, with similar agitation for five minutes. Wash repeatedly with water, then with milk of lime, finally rinse again with water, dry quickly at a gentle heat and varnish while still warm with oil.—H. W.

Important improvement in the Wet Assay and Precipitation of Silver Solutions.—STAS has shown how to avoid the well known error arising from the excess of Na Cl always used in the precipitation of Ag, due to the solubility of Ag Cl therein; by precipitating as a *bromide*, instead of a chloride, no similar solubility interfering here.—H. W.

"Ne Sutor ultra Crepidam."

In our last, a few sentences were hastily thrown out, in rejoinder to a profound critique of that great modern chemical (and comical) authority, the New York *World*, upon the recent lecture of Prof. B. SILLIMAN, before the American Institute, on "The Philosophy of the Tea Kettle; which *other people* found to be so altogether admirable. It has been objected that our remarks, though clear enough to scientists, were too concise to convey fully either our meaning or our moral to many readers. On revision, we cry *peccavimus!* the fault being in an inadvertent omission of a portion of the intended quotation from TYNDALL. We should have written thus:—TYNDALL himself says that when *water* "is chilled, it contracts, becomes thus heavier, and sinks by its superior weight * * * but nature then steps aside from her ordinary proceeding, causes the water to expand by cooling * * * *Solidification ensues;* while in the case of *bismuth* he says "the metal cooled, *solidified*, expanded, etc.—our object being to point out that instead of the assumed *analogy* between the two cases of water and bismuth, a most perfect *antithesis* is here shown; inasmuch as in the one the sequence of the phenomena is expansion and then solidification, and in the other solidification and then expansion. As to our *moral*, is it not comprehended in four words in the intitulation of this item? H. W.

ERRATUM.

In the title to to the abstract of BOURGOIN's memoir on Electrolysis, in our last, "*Formation*" should read *Function.*

Correspondence.

[Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith.—EDS.]

Prof. Chandler's Report on Dangerous Kerosene Oil.

NEW YORK, January 20, 1869.

MESSRS. EDITORS: I perceive by the concluding sentence in your last issue that Prof. Chandler intends to furnish you with a corrected copy of his late elaborate report to the Board of Health upon kerosene oils, accompanied by a list of 78 tests made of specimens procured in this city.

I wish that in the corrected report promised to us the Professor will have the kindness to give first a really intelligible report of these tests so that you and I may truly comprehend what I confess at this moment I cannot, and which, worse still, I cannot get from any person an explanation of; and upon the single point which the public care to be informed of, viz.: *At what temperature do the samples quoted become dangerous?* or to be more precise, at what temperature does he find samples 2 and 3 (73 Bayard street and 494 Grand st.), evolve explosive vapor? and at what temperature does he find these samples ignitable? In the table before me (*New York Tribune*, Jan. 13th), I find them reported as follows:

No.		Gravity, deg. Beaume.	Vaporizing point, Fahrenheit, below F.	Burning point, scale below F.
2	72 Bayard st.....	49	31	44
3	494 Grand st.....	46.6	40	60

I select these two merely as examples of about twenty specimens out of the fifty-three quoted, and which I find unintelligible, either owing to misprint or other cause; unintelligible because, even should I strike out as a misprint the words and letters at the head of the second and third columns of figures, "below F," as being (in the absence of explanation) quite incomprehensible, I still fail to conceive it possible that the *so-called* "vaporizing point" could possibly be, respectively, 31° Fahrenheit and 40° Fahrenheit, and the burning points (points of ignition) 44° Fahrenheit or 60° Fahrenheit, unless these samples are, as he tells us of sample No. 1, nearly pure benzine; and then how happens it that if this be so, although he gives us in a supplementary table below the first, the composition of several of the most remarkable samples, he omits these from said table?

I do not doubt, Messrs. Editors, that in his promised corrected report, these difficulties will be corrected, and am simply desirous of showing where difficulties do exist in the report as already given to the public.

At the same time it may not be amiss to ask from Prof. Chandler an opinion upon a point which may have been touched upon by some one, but which, with the utmost watchfulness, I have failed to encounter. The point is this: What shall constitute a perfect test of an oil in question? Or, in other words, what manipulation forms the true method of obtaining a correct result in testing for the point of ignition of an oil? I am not now intending to speak of any particular instrument for testing, but to apply this assertion to each and to any instrument used, that *according to the mode or method of making the test, we can,* FROM THE SAME BARREL OF OIL, *procure half a dozen or more different results,* making the burning point of ignition appear to be 95, 96, 97, 98, 99, 100 or 105, as the case may be. And therefore, if I am correct in this assertion it seems worse than idle to construct laws designating 100° or 110° Fahrenheit as a burning point without defining the mode or method by which this point may be obtained beyond peradventure. It would be very desirable to have from Prof. Chandler or from any one else who possesses a knowledge of the article in question, to inform the public, and in the hope that we may now obtain it, I remain, Respectfully yours,

JOHN TAGLIABUE.

The Steubenville Gas works.

OFFICE STEUBENVILLE GAS COMPANY,
STEUBENVILLE, O., Jan'y 13th, 1869.

MESSRS. EDITORS: I will say to you that your Journal is becoming, in our estimation, more interesting every number. I find it entertaining, practical and instructive. Our American writers are plain matter-of-fact men generally on the subject of gas; they in a great measure dispense with the fine-spun theories and hifalutin technical terms which amount to nothing, either in the heads of those from whom they emanate, or any body else. There are many things in your Journal that are of good practical importance, and some, of course, which are not so much so, excepting perhaps to those who write them. These we have, of course, to take along with the rest. But enough of this. I will further inform you that we have endeavored the past summer to keep along with the age of improvements by enlarging our manufacturing capacity one hundred and fifty per cent. We now have a very neat little retort house sixty feet long, thirty-four feet wide and twenty feet high, slate roof, etc., with five benches of 3 retorts each, capable of manufacturing 65,000 feet of gas per day on a moderate estimate, and with a little change can make much more with the same number of benches. We also constructed our ovens in such a manner that we use all coke. We do this for two reasons: one of which is that coke has a poor sale with us; the other reason is that we consider it economy in our case to use coke and make gas out of the coal. We have not as many miles of main here as many other places. This originated from various causes, the principal one of which is that the company would have to run great distances to reach one or two isolated consumers, and they small at that. But our people are beginning to

appreciate the convenience of gas, so that we expect to lay more main the coming season than we have for several years past. We have about 300 consumers, but expect to increase the number to about 400 the coming season should success attend us. Our price for gas here is $3.50 per 1000 feet, with 5 per cent. off, netting $3.33½ per thousand. Coal costs 8 cents per bushel, delivered at the works from our shafts here in the city. I will some time give you the qualities of our coal, as our whole city is underlaid with it. There are many things I could enumerate to you, but as I have written enough now to tire your patience, and much more than I intended, I will close hoping that success may attend your future efforts in publishing the Journal.

Yours very truly, A. J. CARROLL, Supt.

More Questions to be Answered.

MESSRS. EDITORS: Would you, or any of the Gas Engineers, be so kind as to answer the following ques tions? If I put three kinds of gas made from different materials, say petroleum and Boghead and Newcastle coals, with illuminating power of 14, 20 and 30 candles, specific gravity 4.521, 5.400 and 6.216, will they intermix in the gas-holder immediately, or will they take a certain time before they become one illuminating power. By answering the above you will oblige

J. Mc———.

[Will some of our numerous gas engineers please to give their experience upon this subject?—EDS.]

RALEIGH, N. C., Jan. 26th, 1869.

MESSRS. EDITORS: In a former number of your valuable Journal you printed an article on "Clay *vs.* Iron Retorts," and as clay retorts are almost unknown in the South, I write for information in respect to them in the manufacture of rosin gas; and no doubt some one of your numerous subscribers can give me the required information.

First—If the material of clay retorts is not of too porous a nature for the manufacture of rosin gas, as there is a larger amount of carbonic acid and naphtha in rosin that in coal, and a larger amount of carbonaceous deposit in the retort.

Second—If any of your correspondents have used them in the making of rosin gas, and the result, and if satisfactory.

Your attention to the above will confer a favor, as I wish to try them, but if they have been tried before and not found satisfactory, I do not wish to spend the company's money in trying the experiment. S. M.

[We hope our correspondent above may obtain the desired information from some of those who are practically posted. We will willingly publish any communication upon this subject, because it will be of general interest.—EDS.]

Canadian Plumbago.

Messrs. Editors: To add to the information which Lewis Feuchtwanger communicates to the *Journal of Mining*, I send you two reports upon Canada plumbago properties, which have beeu opened during the past summer, under my superintendence. Specimens from 500 lbs. upwards may now be seen at my office No. 29 Broadway, room 16. It is a well-established fact that the product from this particular district has, during the summer, formed a large amount of the crucibles which are sold and used in this market; namely, that from the Lochaber and Canada Companies, and that it gives great and general satisfaction—by some considered *equal* to the Ceylon, and by others, when mixed with the Ceylon, *superior* to either *separately*. If F. will take the trouble to investigate this fully, I have but little doubt but that he will do the justice to change his statement, when he says that the Ceylon, German, and Ticonderoga *alone* furnish the material for crucibles. *The companies in that district have been unable to supply the demand hitherto*, and the price of which has been constantly on the increase. So far as my experience goes (having devoted some twelve years to this particular branch) the Canada is the *purest and best graphite found on this Continent.*

Your obedient serv't, JOHN L. HALE,
29 Broadway, Room 16.

Commendatory.

YONKERS, N. Y., Jan. 19, 1869.

Messrs. Editors: What is the reason we do not receive the GAS-LIGHT JOURNAL? Have our subscriptions run out and you afraid to trust us? You may as well stop our *dinner days* as your paper. I will enclose $3, and if my presumption is correct it will rectify the difficulty. If not, please see where the hitch is.

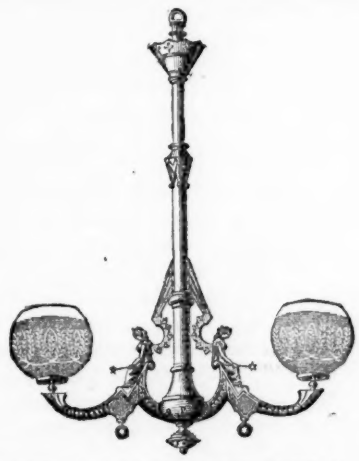
Respectfully yours, JAS. SLADE, Supt.

[This letter tells in such a graphic manner what our patrons think of our Journal, that we give it a place here.—EDS.]

Fodell's System of Bookkeeping.

The following subscriptions to "Fodell's System of Book-keeping for Gas-Light Companies" have been received, making in all 48:

Indianapolis Gas Light and Coke Co.
James T. Duff, Urbana, Ohio.
Jos. Battin, Gas and Water Engineer, 1703 Mount Vernon street, Philadelphia, Pa.
J. H. Gautier & Co., Jersey City, N. J.
D. Parrish, Jr., Gas and Hydraulic Engineer, 205½ Walnut street, Philadelphia, Pa.



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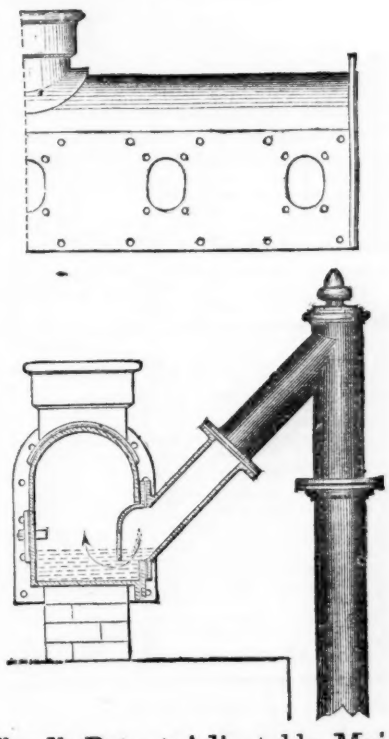

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AND

CHEMICAL REPERTORY.

Published on the 2d and 16th of Each Month

At No. 22 Pine Street, New York.

M. L. CALLENDER & CO.,

EDITORS AND PROPRIETORS.

Consulting Chemist,
Geologist and General Scientist,
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

TUESDAY, FEBRUARY 2, 1869.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS* or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. Newsdealers will please send orders to them.

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TO OUR SUBSCRIBERS AND PATRONS.

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Answers to Correspondents.

G. R., of Terre Haute, Ind.—Your communication is received and in type, but owing to the crowded state of our columns we have to defer its publication for our next issue.

J. B., of Ill.—You will find in the present issue of our Journal a communication asking for the information you desire. No doubt we shall be enabled to print an answer to the question in our next number.

H. N. S., of Ohio.—The ammoniacal liquor is valuable as a source of salts of ammonia, and should bring a price which should remunerate the company, at least for the trouble of saving it.

C. R. L., of N. Y.—The ancient city of Athens is lighted with gas. A French company had the enterprise to build the works, which were set in operation on the evening of October 31st, 1862, we believe.

P. G., of Ky.—Some engineers use a cement composed of 20 lbs. sulphate of iron (gypsum) made into a pulp with water, and added to 10 lbs. of iron borings saturated with a strong solution of sal ammoniac.

P. O., of Me.—To form the sal ammoniac of commerce, the ammoniacal water obtained in gas works is to be saturated with hydrochloric acid (muriatic acid). It is usually evaporated in vessels of lead and then run into wooden coolers. The salt is then to be dried in stoves, and finally sublimed in iron pots with large domes.

GAS AS A CALORIFIC AGENT.

Notwithstanding the use of coal-gas for illuminating purposes has extended rapidly, and its merits as an economical source of artificial light have been generally conceded, yet, in this country at least, its adoption as a calorific agent has been so slow as to disappoint the sanguine hopes of its early advocates. The advantages claimed for gas as a source of heat for domestic purposes are many, and while it is capable of diffusing a temperature sufficiently elevated for culinary purposes, and for warming large apartments, yet comparatively little of it is used for these purposes, and coal and wood fires yet retain their ascendancy. The advantages claimed for gas in this respect are cleanliness and freedom from trouble, it being unnecessary to carry coal or other fuel to feed the fire, or to remove ashes, etc. The rapidity with which heat may be generated and the ability to instantaneously extinguish the fire are great recommendations—particularly in summer when it is desirable to perform the duties of the *cuisine* with as little elevation of temperature as possible.

In England, and particularly in London, gas is largely used for cooking, and it is said to perform its office most acceptably. For families living in apartments, where the trouble and expense of carrying coal or other fuel would be great, gas has proved a great desideratum. By means of approved burners, and admixture with a proper portion of atmospheric air at the time of consumption, a large amount of heat is generated, and where sufficient ventilation may be had, the products of combustion are readily conveyed away, causing no inconvenience or injurious results. Possessing these advantages, it may appear strange that it is not more generally adopted; doubtless it would be, but for the fact that at the average price which is paid for gas in this country, the ordinary methods for generating heat have the preference because of their being more economical, and thus better suited to the wants of the public at large.

That the calorific properties of gas are equal to meet other agents used for heating, is proved by the fact that in analytical chemical laboratories, charcoal and other fires have been, to a considerable extent, replaced by gas, and the operations of boiling, evaporation, fusion, ultimate organic analysis, and even cupellation, are now performed by easily regulated gas furnaces, their use conducing far more to the personal comfort of the operator, than the troublesome and cumbersome stoves formerly employed. The inventions of gas furnaces, such as are constructed by Griffin and others, in England, and Krause and Haskins in this country, have displayed much ingenuity, and by their use, the laboratory of the chemist presents a much cleaner appearance than formerly—no dangerous sparks or cinders being formed, nor ashes being blown about the room, to the detriment of other substances in the vicinity.

The inventors of these improved gas furnaces, with their well contrived burners, have conferred a great boon to the profession, and have lightened the labors of many a tyro in chemistry to an extent hardly before dreamed of. From the success attending the use of gas stoves in the laboratory, it is safe to assert that many of the operations of the household could be performed in the same manner; the only objection against them being the price of gas, which prevents their more extended use. The probability is that if the price of gas were reduced, so as to make it practicable to employ gas for heating, the demand for it would increase in a large ratio, and the concession might be more than atoned for in the enlarged sales which would undoubtedly follow.

The introduction of the improved process of manufacturing gas by the Gwynne-Harris plan of decomposing high steam to produce hydrogen as a heating agent, and for a motive power in lieu of steam power, is commencing a new epoch in the history of political and domestic economy. The same process applied to the ordinary coal gas manufacture lessens the first cost of production so greatly that it will soon be a matter of consideration with gas companies whether the selling price may not be lessened, with a view to its introduction into these new industries; thus opening a much more extensive demand, which in the aggregate will largely increase the dividends of gas companies, and add a new element to the progressive benefit of the age.

A THING OF BEAUTY.

The attention of city corporations, gas companies and manufacturers will be especially drawn to the new and improved lamp post which will be found fully described under the head of "Special Notices." Practical men only need to read the description to become convinced of its great utility and superiority over the common post.

It consists, mainly, of a short base, which is fixed permanently in the earth with the gas pipe, and a connecting cock easy of access at the top of it. The pillar for the lamp fits into this, with a sleeve having a shoulder. The collar of the base supports and gives strength to the whole. It will be seen that lamps can be fitted and pipes altered and repaired without the necessity of removing the base at all after it is once placed. The top pillar is easily removed from its setting in the base for the purposes mentioned, and winter will offer no obstruction to repairs. If injury occurs to the pillar it is easily replaced at small cost, compared to the old method of digging up the entire post.

We consider this one of the few important improvements in this line, which is really valuable, and it is destined to become very popular.

The advantage of this patent lamp over the old style is:—

1st. The saving of the base or bottom part of the post when the column is broken, the post being made in two parts. The broken column can be taken out of the base and a new one placed in without disturbing the base, and it requires no digging.

2nd. When the old style of post is broken the bottom of the post has to be dug out, and often in winter and wet weather this cannot be done until the ground thaws or dries up sufficiently to make the post solid; all this is obviated in the new patent post

3rd. A lighter and better casting can be made from the new patent than the old; it can be mended or repaired easier, because it can be handled better owing to the length and lightness.

In case the column is so broken that it cannot be repaired, there is a saving of one-third the original cost of the post, by the base being secure and perfect.

4th. In case of stoppage of gas in stand pipe the column can be lifted out, the stand-pipe detached, cleaned, and put up again in fifteen minutes. No digging being required as is now done with the old post.

SPECIAL NOTICES.

PATENT LAMP POST.—This invention relates to constructing lamp posts in two parts, viz.: A base which is set in the ground, and a column or upper part which has a sleeve on its lower end, which fits into the upper end of the base. By making lamp posts in this manner great saving may be made in the original cost of the post, and in case the upper part of the post is broken it is easily replaced by a

new one, without the trouble and expense of digging up the old base, which frequently has to be delayed from inclemency of the weather.

There is a collar around the upper end of the base, on which the base of the upper part rests. The upper piece of the post has a sleeve on its lower end, below the base, which fits into the base. The sleeve has a number of lugs or chipping strips projecting from its sides, which can, in a few minutes, be chipped off sufficiently to let the sleeve fit the base, no other tools being required but a hammer and cold chisel. In case the upper part of the post is broken so that it cannot be repaired the base is saved, which is one third the cost of the post.

In case the gas pipes become stopped by freezing or any other cause, the column can be lifted out from the base, the gas pipe (or stand pipe) detached, the obstruction removed, and all put up in good order in the space of twenty or thirty minutes, which is a great advantage over the old posts. A cock can be put on the upper end of the bend of the gas pipe, and in case of breakage can be turned so as to shut off the gas. This also is no small item, and cannot be done with the old post. A stronger, lighter, and better casting can be made, and at the same time more sure to turn out better than the old posts.

The right to manufacture, or State rights for sale, on reasonable terms. Address Editors Gas-Light Journal, 22 Pine street, N. Y.

Fairmount Gas Coal.—In the former publication of the report of the test of this coal by Mr. Joseph A. Sabbaton, the second paragraph was accidentally transposed. It should have come after Mr. Sabbaton's signature, as it was no part of the report, but belonged to the matter following. We therefore republish the entire report and notice in its proper order.

FAIRMOUNT GAS COAL—SECOND ANALYSIS.

Manhattan Gas Light Company,
Engineer's Office, 18th St Station, N. R.
New York, Nov. 14, 1868.

Mr. Henry Attrill, Baltimore, Md.

Dear Sir: I have received two hogsheads West Fairmount Coal, said to be mined from a greater depth than the sample tested October 28th, which was represented to be from the out crop of the vein. This sample is a purer coal than the other. It is in very large pieces, and free from earthy matter.

Analysis of the Coal: Volatile Matter	37.0
Fixed Carbon	39.0
Ash - -	4.0
	200.0

This maximum yield of gas per ton of 2240 lbs. is 9681 feet. When the yield was restricted to 9500 feet the illuminating power of the gas was equal to 19.50 candles. The yield of coke was 40 bushels, weighing 1500 lbs. The quality was good, making but little ash or clinker. This coal contains considerably less sulphur than the first sample. One bushel of the hydrate of lime purifying 4180 feet of gas.

Very respectfully,
Jos. A. Sabbatton, Engineer.

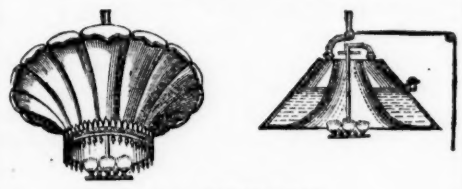
This coal is unequalled for gas manufacturers, owing to its freedom from sulphur, and as it is not injured by exposure to the atmosphere it is particularly fitted to ship long voyages. For household and office use it is superior to Scotch Cannel, and it can be delivered at any seaport town at half its cost.

The attention of gas companies will be directed to the very high illuminating power of the gas and the large amount of coke per ton of coal used, which peculiarly fits it to take the place of English cannel to mix with poor coals to bring up their candle power.

For further information address Henry Y. Attrill, proprietor of West Fairmount Gas Coal Mines, No. 35 South Gay street, Baltimore, Md.

Vick's Illustrated Circular and Floral Guide.—To the lover of flowers, we take occasion to recommend Mr. James Vick, the celebrated florist, whose name is fast becoming famous among the cultivators and lovers of flowers. He annually publishes a catalogue in pamphlet form filled with all information and illustrations of bulbs and flowers with prices attached, which is enough to make the mouth of the amateur horticulturist water with feverish desire. He imports only the finest quality of plants, and grows whole acres of choice flowers. By sending 10 cents to him for his catalogue, we are convinced that you will be charmed by its result.

The New Light.



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Will be paid to any one who can produce from OXYGEN GAS or any other source, a light as cheap as that supplied by the Hydrocarbon Light Company, or that can prove that one foot of New York gas cannot be made by their process to give a light equal to three feet. Suitable for all purposes of illumination. May be seen in practical operation at the Company's store, 74 Maiden-lane, or at 839 Broadway, New York, and Messrs. Oppenheim & Co.'s, 251 Fulton street, Brooklyn. 219

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Wooden Water and Gas Pipe.
These Pipes combine
Strength, Durability, and Economy.

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Wyckoff's Patent Gas Pipe is less expensive than other kinds, more serviceable and more durable; being coated, inside and outside, with imperishable material, and impervious to air, gas or water, and warranted to give satisfaction. 219tf

DISSOLUTION AND CO-PARTNERSHIP.

DISSOLUTION.—NOTICE IS HEREBY GIVEN that the Co-partnership heretofore existing between Jesse W. Starr and John F. Starr, heretofore existing under the name, style, and firm of J. W. & J. F. Starr, has been this day dissolved by mutual consent. Jesse W. Starr is authorized to collect all moneys due and to settle all accounts and liabilities against them.
Jesse W. Starr,
John F. Starr.
Camden, N. J., December 31, 1868.

CO-PARTNERSHIP.—THE UNDERSIGNED have this day formed a Co-partnership under the name, style, and firm of Jesse W. Starr & Sons, and will continue business as Iron Founders, Manufacturers of Gas Apparatus, Cast Iron Street Mains for Water and Gas, &c., at the Camden Iron Works, Camden, N. J.
Jesse W. Starr,
Benj. A. Starr,
Benj. F. Archer.
Camden, N. J., January 1, 1860,

MINERAL PROPERTIES IN CANADA.—DR. HALE, of 29 Broadway, Room 16, after the last 8 months' exploration, can furnish particulars on first-class properties of Coal, Copper, Gold, Galena, Plumbago or Graphite, and Phosphate of Lime. Office open from 10 to 3 each day. 219 3m

MINES, ORES AND MINERALS.—WOULD sell out Office Furniture and Mineral Specimens at a valuation, and aid a competent, trustworthy party as my successor on liberal terms. Apply at 29 Broadway, Room 16.
New York, January 19, 1869. 219 sm.

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HAS EFFECTED ARRANGEMENTS WHICH give him especial advantages in Analyses of Gas and Gas Coals, and in the practical determination of the value of Coal for Gas-Making purposes. Analyses of Ores, Minerals, Mineral Waters, etc. No. 26 Pine street, N. Y.; or this office.

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SPRINGFIELD, MASS.
VALVE GAS BURNER
TO REGULATE THE FLOW OF GAS & SAVE IT.
It is unequalled in this respect. Try it and see. 213-2m

A SYSTEM FOR KEEPING THE
Books and Accounts of Gas Companies.
BY W. P. FODELL.

This work is gotten up by W. P. Fodell, Secretary and Treasurer of the Northern Liberties Gas Company, Philadelphia, and is a compilation of forms for books and directions for their use, and is intended to present a system that shall be at once plain, orderly and full, from which reports and statements of the conduct of the works of any required nature can be made at any time.
The work will be divided into four parts, each connected with the other, viz:
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Part II.—Relating to Registration of Consumers—Registrar's Department.
Part III.—Relating to Collection of Bills—Receiver's Department.
Part IV.—Relating to Stockholders—Treasurer's and Secretary's Departments.
Any one or more of the books of each department might be used in the infancy of a work, without adopting the whole; or incorporated into a work already in operation.
Builders of gas-works could put this book in the hands of a person of ordinary intelligence, enabling him to keep the history properly.
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Mines at Fairmount, Marion Co., West Va.

Oliver Jackson, Esq., Pres. First National Bank of Fairmount, Manager.
Wharves, Hankey's Locust Point, } Baltimore, Md.
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We have used Mr. Shackelton's patent system of heating our kettles and factory by exhaust steam for seven months We find that there is a saving of coal of about 50 per cent.
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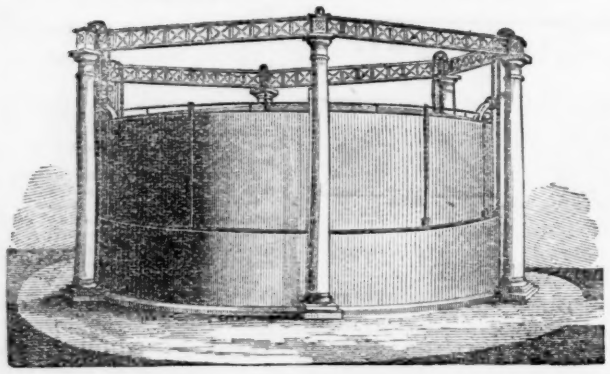

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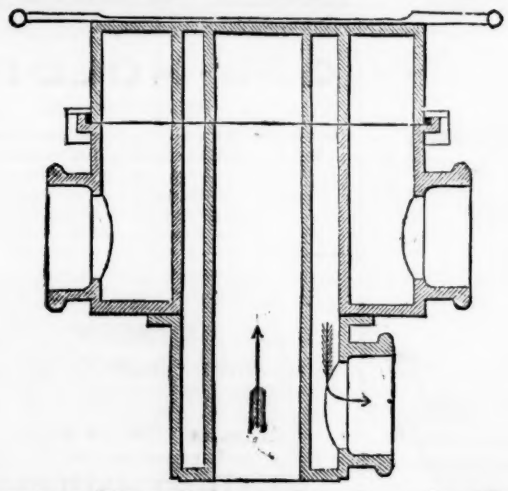

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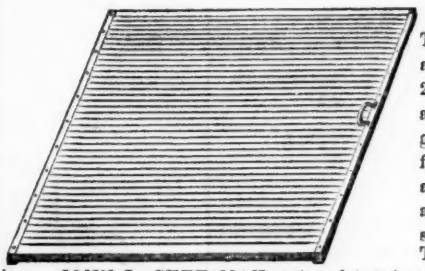

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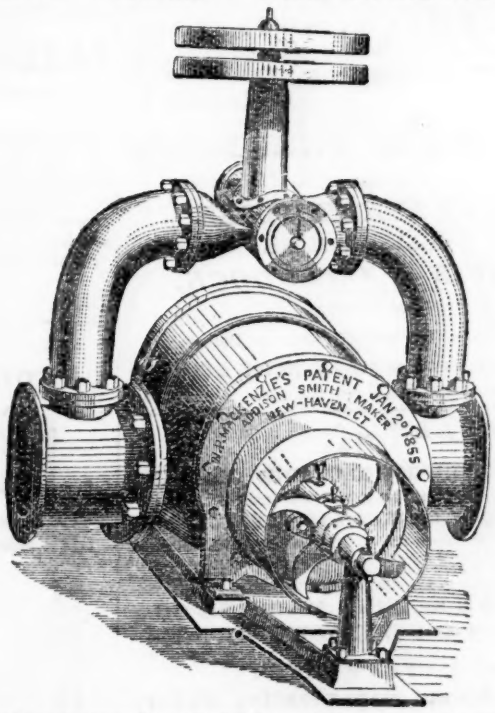

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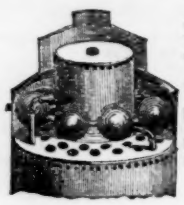

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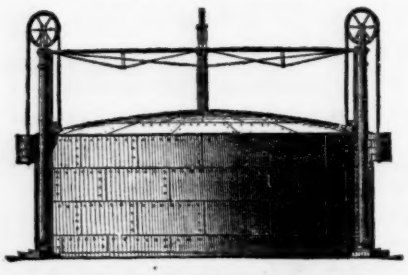

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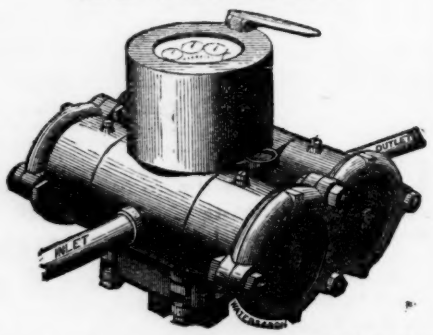

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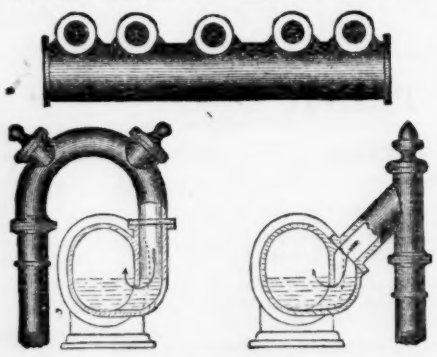

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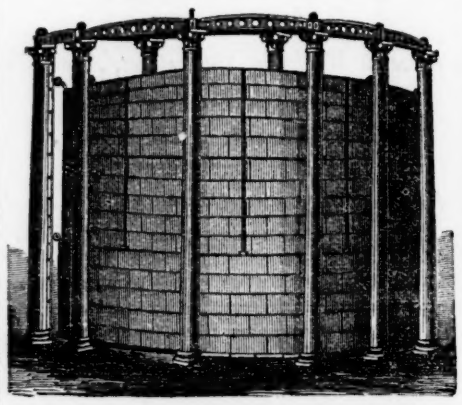

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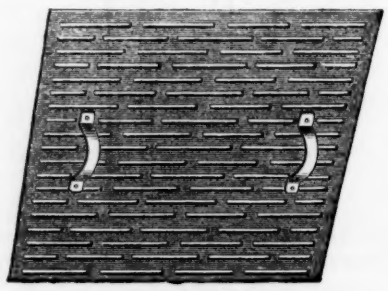

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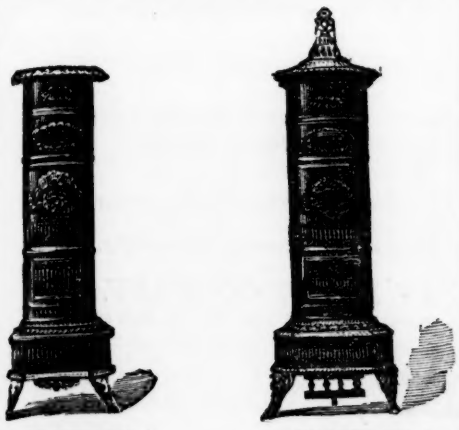

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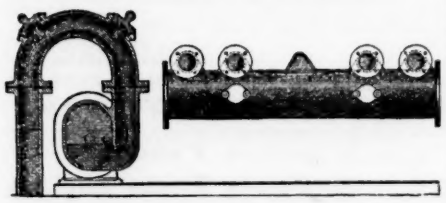

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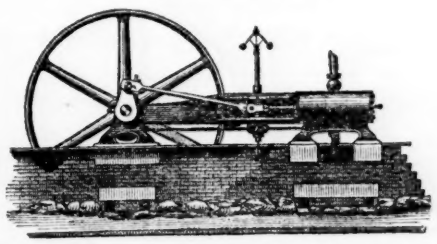

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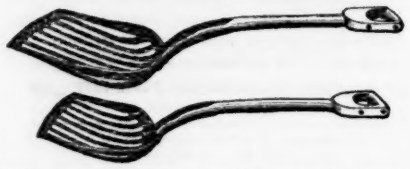

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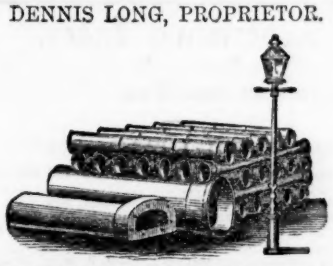

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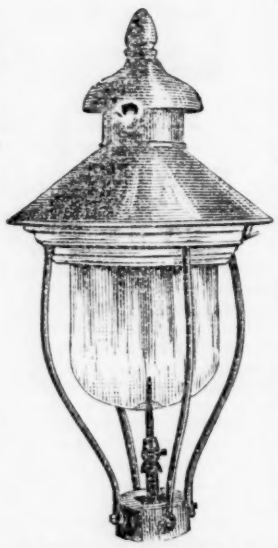

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